

Habitats and Adaptations

3-2 The student will demonstrate an understanding of the structures, characteristics, and adaptations of organisms that allow them to function and survive within their habitats. (Life Science)

3.2.1 Illustrate the life cycles of seed plants and various animals and summarize how they grow and are adapted to conditions within their habitats.

Taxonomy level: 2.2 and 2.4-B Understand Conceptual Knowledge

Previous/Future knowledge: Students have been introduced to major structures and basic life cycle stages of plants in 1st grade (1-2.2, 1-2.4) and to how these structures help plants survive in their habitats (1-2.6). Students have also been introduced to the various stages in the life cycle of animals in 2nd grade (2-2.5). In 6th grade (6-2), students will develop a more in-depth understanding of the structures, processes, and responses of plants that allow them to survive and reproduce.

It is essential for students to know that every plant and animal has a pattern of growth and development called a *life cycle*. As seed plants and animals go through their life cycles, they grow within a *habitat* for which their needs can be met. Plants and animals have *adaptations* that allow them to survive the conditions within habitats in which they live.

- An *adaptation* is a characteristic that improves the organism's ability to survive.
- A *habitat* is a place where an organism or groups of organisms live and obtain the air, food, water, shelter or space, or light needed to survive.

Life Cycle of Seed Plants

It is essential for students to know the stages of growth in seed plants that are part of their life cycle.

Seed

- After *pollination* (the spreading of pollen from flower to flower) occurs, seeds are produced and may be stored in fruits.
- Seeds contain tiny undeveloped plants and enough food for growth to start.
- Seeds need water and warmth to *germinate* (begin to grow).

Seedling

- Seedlings produce the parts of the plant that will be needed for the adult plant to survive in its habitat.
- Roots begin to grow and take in nutrients and water from the habitat.
- The stem starts to grow towards light and the first leaves form on the stem.
- Later, more leaves will form that help the plant make its food.

Mature Plant

- Mature plants have the same structures (for example roots, stems, and leaves) as seedlings, but in addition they develop flowers or cones, which produce seeds.

Life Cycles of Various Animals

It is essential for students to know the stages of growth that are part of the life cycles in a variety of animal types. These stages are not the same for all animals.

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- Some animals give birth to baby animals that look like small adults. As the babies grow, they change in size. Other changes might be color, shape, or type of covering.
- For example, horses give birth to babies that look like small horses. Chickens lay eggs that hatch babies that look like small chickens.
- Some animals begin as an egg and then undergo changes in their life cycle. These changes may be in appearance, color, shape, or growth of new structures. These changes in form are called *metamorphosis*.
- For example, in a beetle the stages of metamorphosis are called egg, larva, pupa, and adult. In a grasshopper, the stages of metamorphosis are egg, young (nymph), and adult.

Chart for teacher information only

Animal Family	Stages of Development	Examples
Mammal	Young—Adult	Dog, squirrel, human, whale
Reptile	Egg – Young – Adult	Snake, turtle, lizard, alligator
	Young – Adult	Rattlesnake (live birth)
Amphibian	Egg – Young – Adult	Frog, toad, salamander
Insect	Egg—Larva—Pupa—Adult	Butterfly, beetle, housefly, mosquito
	Egg—Young—Adult	Grasshopper, cockroach, praying mantis
Bird	Egg—Young—Adult	Chicken, robin, hawk, duck
Fish	Young—Adult	Guppies (live birth), goldfish (live birth),
	Egg – Young— Adult	minnows (egg), catfish (egg),

It is essential for students to know how plants and animals are adapted to their habitats so that their needs can be met.

Adaptations of Seed Plants

Some plants have special structural *adaptations* for meeting their needs in their particular habitat. Some examples of plant adaptations to conditions in their habitat may be:

Roots

- Roots take in water and nutrients from the habitat.
- They may also hold the plant in place and store food and water.
- Each variety of plant will survive where its roots size, length, and spread are adapted to the habitat.
- Some examples of root adaptations may be:
 - Water lilies have long roots that can take in nutrients from the muddy bottoms of ponds or lakes.
 - Cacti have roots that spread out close to the surface for living in dry habitats.
 - Carrots and dandelions have a large, thick root that is longer than its other roots. This long root helps the plant survive by reaching far underground to find water and to firmly anchor the plant.

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Stems

- Stems move and store water and nutrients in the plant. Stems also provide support and protection for the plant. Some examples of stem adaptations may be:
 - Vines have stems that can climb and stick to various surfaces to ensure that the leaves are exposed to light.
 - Corn and sunflowers have stems that grow thick and strong but remain green and flexible so that they can grow toward the sun.
 - Trees develop woody stems to support their size and provide protection during their long life cycles.
 - Cacti have thick stems that store water when the habitat does not provide it.
 - Some stems have thorns that provide protection.

Leaves

- Leaves produce food for plants in the presence of light.
- Each variety of plant will survive where its leaf size, texture, thickness, and shape are adapted to the habitat.
- Some examples of leaf adaptations may be:
 - Water lilies develop wide leaves that allow them to float on the water to capture sunlight to make food.
 - Evergreen trees have leaves that are thin, waxy needles to protect them from freezing and from losing water.

Flowers

- Flowers often have special sizes, smells, shapes, or colors that attract organisms for pollination.

Fruit

- Fruits are formed around the seed to protect it. Some examples of fruit adaptations may be:
 - Some fruits are moist and fleshy (tomatoes, grapes, or peaches). Fleshy fruits attract animals that eat them helping to disperse the seeds.
 - Others fruits are dry and/or hard (coconuts, walnuts or pea pods).

Seeds

- Some seeds begin to grow as soon as conditions allow for germination.
- Seeds have adaptations that allow them to be dispersed and also to have enough food for the plant until it begins making its own food.

Adaptations of Animals

Some animals have special adaptations for living in their particular habitat. Some examples of animal adaptations to conditions in their habitat may be:

- In habitats where the temperature is cold, animals may have blubber or thick fur for warmth.

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- In a water habitat, some animals have special structures that allow them to live as air-breathing animals in the water.
- In habitats where food is scarce, some animals may have long necks to obtain food (giraffe) or special storage structures for food and water (camel).
- In habitats where the temperature is very hot, animals may seek food at night (nocturnal) or seek shelter in the shade during the day.

It is not essential for students to know the parts or types of leaves, the specific structures of flowers, or how seeds are produced, as this will be further developed in 6th grade (6-2). Students do not need to know the term incomplete metamorphosis.

Assessment guidelines:

One objective of this indicator is to *illustrate* the life cycles of seed plants and a variety of animals; therefore, the primary focus of assessment should be to give or use illustrations to show the stages in the life cycles of seed plants and a variety of animals. However, appropriate assessments should also require students to *summarize* the steps of a seed plant life cycle; or *compare* life cycles of a variety of animals.

Another objective of this indicator is to *summarize* how seed plants and animals are adapted to their particular habitats; therefore, the primary focus of assessment should be to generalize the major points about how the structures of plants and animals assist those organisms in meeting their needs for survival within their habitats. However, appropriate assessments should also require students to *match* a plant or animal with its habitat based on its structural adaptations; or *identify* structures of plants and animals that allow them to survive in a habitat.